Rijkswaterstaat
Rijksinstituut voor Kust en Zee/RIKZ
Bibliotheek (Den Haag)

C-3809 512
User manual

DI 192073.1

Report on a

TIDAL MOVEMENT CORRECTION PROGRAM

USER MANUAL

Prepared for: Rijkswaterstaat
Tidal Waters Division
MAST*TRA1

October 1992

Rijkswaterstaat
Rijksinstituut voor Kust en Zee/RIKZ
Bibliotheek (Middelburg)

C - 380g 512
USER MANUAL

Oceanographic Company of the Netherlands
Rotterdamseweg 185
Delft

Rijkswaterstaat
Tidal Waters Division
Koningskade 4
The Hague

Contents

Introduction . . . . . - 1 -

1. Installation . . . . . - 2 -

2. Getting started . . . . . - 3 -
2.1. The openingsscreen and function keys . . . . . - 3 -
2.2. Information . . . . . - 5 -
2.3. Tidal Correction . . . . . - 6 -
2.3.1. Tidal Correction | Flow Simulation Model . . . . . - 7 -
2.3.1.1. Tidal Correction | Flow Simulation Model | Grid Reference Point . . . . . - 7 -
2.3.1.2. Tidal Correction | Flow Simulation Model | Grid Dimensions . . . . . - 9 -
2.3.1.3. Tidal Correction | Flow Simulation Model | Model File Settings . . . . . - 10 -
2.3.1.4. Tidal Correction | Flow Simulation Model | Model Filenames . . . . . - 11 -
2.3.2. Tidal Correction | Measurements . . . . . - 12 -
2.3.3. Tidal Correction | Tidal Movement Correction . . . . . - 14 -
2.4. Surfer . . . . . - 14 -
2.4.1. Surfer | Directory . . . . . - 16 -
2.4.2. Surfer | Install . . . . . - 16 -
2.4.3. Surfer | Grid . . . . . - 16 -
2.4.4. Surfer | Topo . . . . . - 17 -
2.4.5. Surfer | Surf . . . . . - 17 -
2.4.6. Surfer | View . . . . . - 17 -
2.4.7. Surfer | Plot . . . . . - 17 -
2.4.8. Surfer | Util . . . . . - 17 -

3. The Tidal Movement Correction program TMC . . . . . - 18 -
3.1. Description of the program TMC.EXE (TMC.FOR) . . . . . - 18 -
3.2. Description of the displacement model files . . . . . - 18 -
3.3. Description of the measurement data file . . . . . - 19 -

References . . . . . - 20 -

Introduction.

In tidally energetic seas results from ship surveys have to be handled with great care. Mostly results will give useful spatial distribution when quasi-synoptic presentations can be made. For this the coordinates need to be relative to the moving water masses.

The research vessel however will provide Earth-fixed positions. Therefore the coordinates have to be transformed from Earth-fixed coordinates to coordinates relative to the water. This can be done by using displacements (current) from a numerical model tuned for the specific area of interest.

The Tidal Movement Correction program (TMC.EXE) converts the Earth-fixed coordinates to water-fixed coordinates. The program TMCSHELL.EXE is an interface to generate the configuration file for TMC and run TMC.EXE.

This manual takes you step by step through the whole program. If you follow all these steps the program should run smoothly.

This program is available without charge from :

Rijkswaterstaat
Tidal Waters Division A.O.C.T.

p.o. box 20907
NL 2500 EX The Hague

tel : (+3170) - 3745521
fax : (+3170) - 3282059

1. Installation.

On the diskette labelled TMC are residing the following files :

1.	TMC.EXE	this is the Tidal Movement Correction program to correct positions for tidal movement with the use of data from a flow simulation model;
2.	TMCSHELL.EXE	this is an interface to configure the configuration file for the program TMC.EXE;
3.	TMCSHELL.HLP	this is the help file for the program TMCSHELL.EXE;
4.	TMCSHELL.CFG	this is an example configuration file for the program TMCSHELL.EXE.

To install the program make a directory, for instance TMC, and copy the files to this directory :

```
> md tmc
> cd tmc
> copy a: *.*
```

Now TMCSHELL is ready to use.

2. Getting started.

Before you start the program TMCSHELL you have to make sure that the following files are available on the harddisk :

1. the program files : the files as mentioned under Installation
2. the measurement file : the files containing the uncorrected measurement positions
3. the model data-files : the files containing the data from the model for flow simulation.

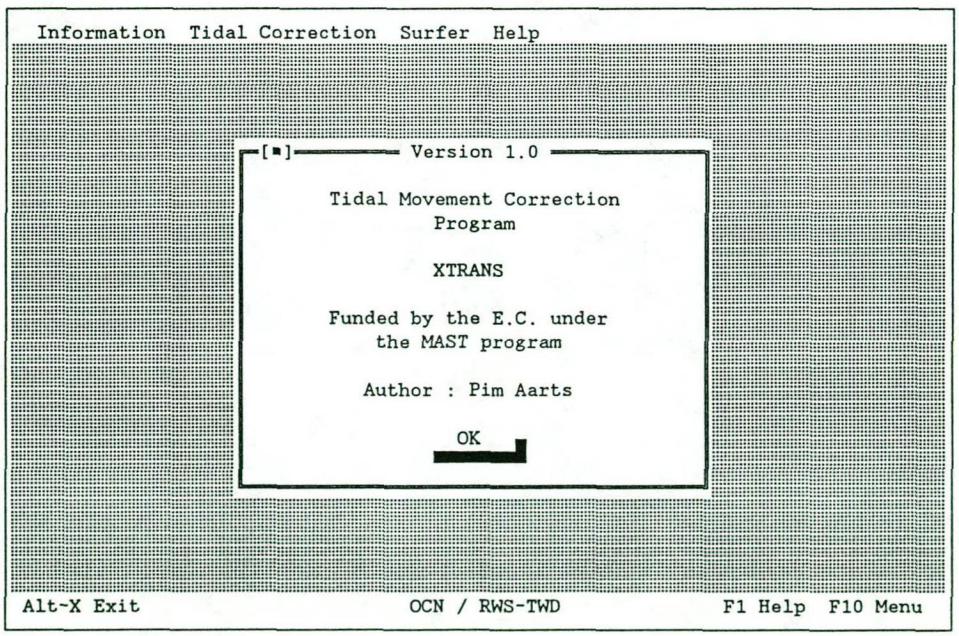
Make sure that the measurement file and the data-files have the correct format (see paragraph 3.2).

2.1. The openingsscreen and function keys.

Now start TMCSHELL by typing :

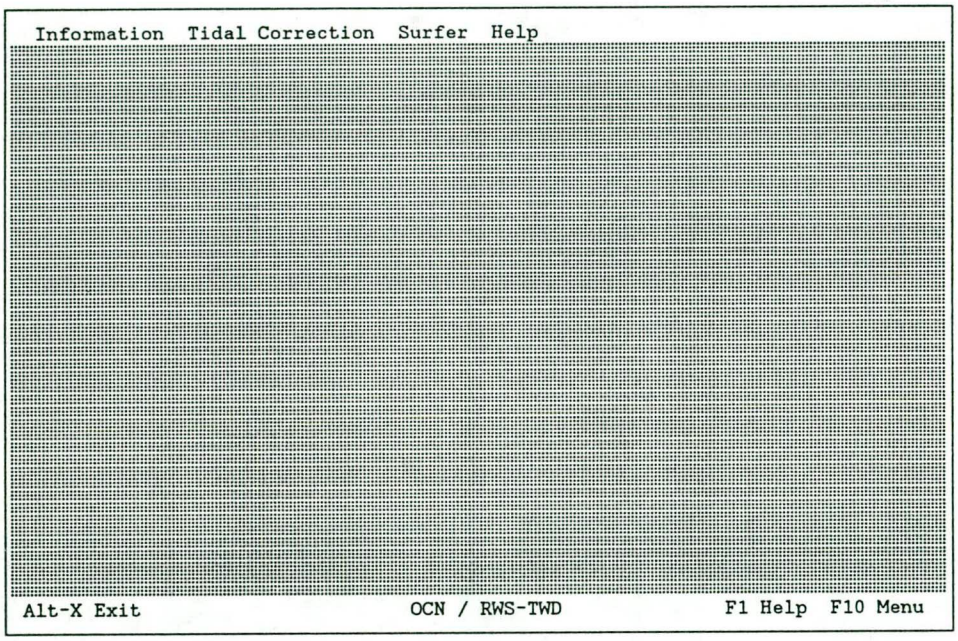
> tmcshell

On your monitor will appear the openingsscreen off TMCSHELL.



Pressing **Enter** or clicking with the mouse on the **OK**-button will close the openingsscreen dialog and the bare desktop will remain.

In the desktop several items can be distinguished. The bottom line forms the status-line. On this status-line hot keys with commands are shown to remind you. The top line of the screen forms the menu-bar. The menu-bar gives access to the different program units. In the next paragraphs all these program units will be discussed.



In TMCSHELL the following keys are defined :

F1	Context sensitive help
F10	Activate menu-bar
Alt-X	Exit TMCSHELL to DOS
Alt-char	Activate menu-item with highlighted character.

In the dialog boxes the following keys are defined :

Esc	Leave dialog box without changing the variables
Tab	Move forward one item in a dialog box
Shift+Tab	Move backward one item in a dialog box

In the input boxes the following keys are defined :

Home	Go to beginning of line
End	Go to end of line
Left Cursor Key ←	Move cursor left
Right Cursor Key →	Move cursor right

Furthermore TMCSHELL provides mouse support. Clicking on the menu-bar, on a menu-item, or on an item in a dialog box with the mouse will activate respectively the menu-bar, the menu-item or the item in the dialog box.

2.2. Information.

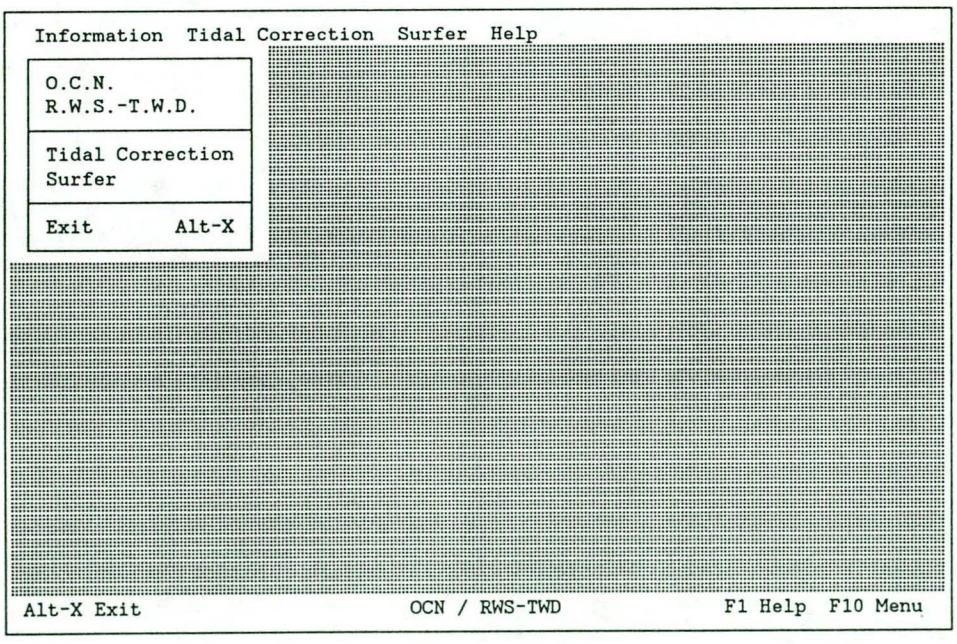
Pressing **F10** (Activate menu-bar) will make the menu-bar at the top of the screen active. The menu-item active label (green bar) appears on the item Information. With the cursor keys the active menu-item can be changed.

The item ***Information*** gives access to information on organisations involved in the development of the program TMCSHELL :

- ***O.C.N.***
- ***R.W.S.-T.W.D.***

and a short description on the programs :

- ***Tidal Movement Correction program***
- ***Surfer***



By pressing **Enter** a pull-down menu appears with the items ***O.C.N.***, ***R.W.S.-T.W.D.***, ***Tidal Correction***, ***Surfer***, and ***Exit***.

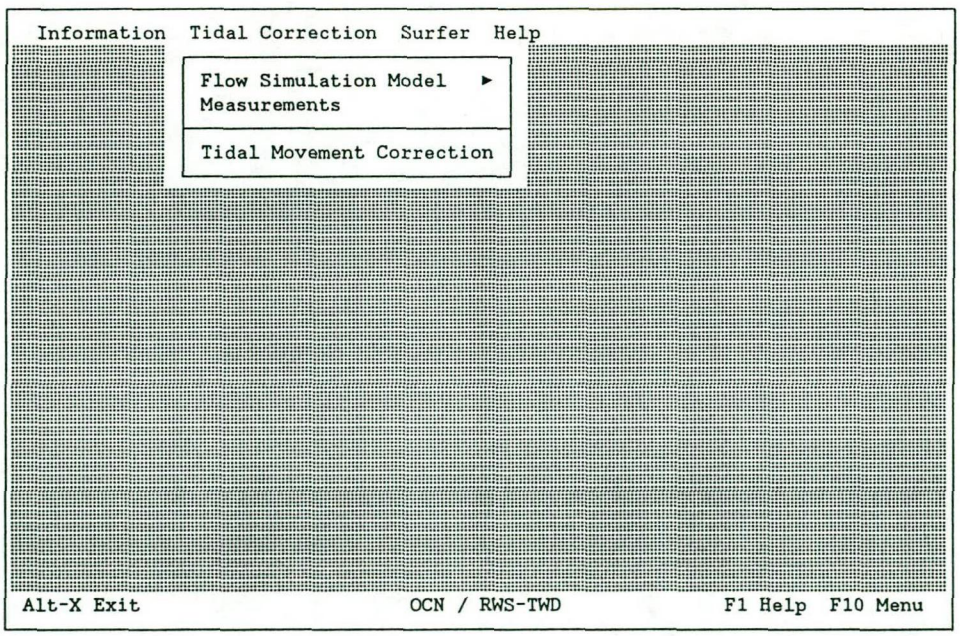
With the up (↑) and down (↓) cursor keys a menu-item can be selected and by pressing **Enter** a menu-item can be executed. Read the information and the short descriptions by executing each item.

The item ***Exit*** exits TMCSHELL to DOS.

2.3. Tidal Correction.

The Tidal Movement Correction program TMC needs a configuration file to run. This configuration file is made by the menu-items in the pull-down menu of ***Tidal Correction***. The menu-items defined under ***Tidal Correction*** are :

- ***Flow Simulation Model***
- ***Measurements***
- ***Tidal Movement Correction***



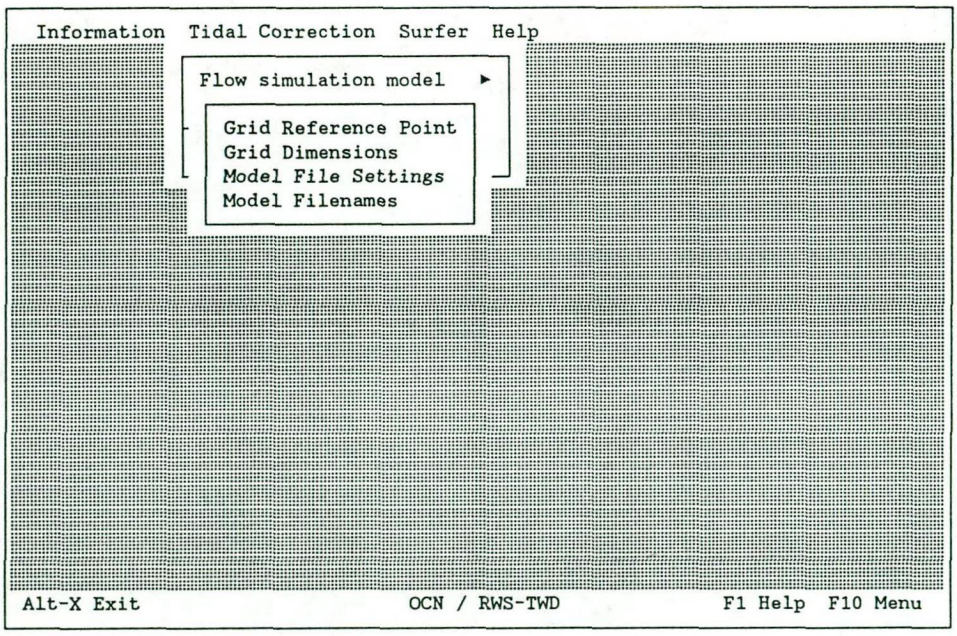
2.3.1. Tidal Correction | Flow Simulation Model.

In order to run the Tidal Movement Correction program TMC has to be provided with some information on the numerical model that has calculated the current data. Four categories can be distinguished :

- Reference point of the grid with respect to Earth coordinates
- Size and dimensions of the grid
- General information about the model data-files
- Names of the data-files from the model

Therefore the item ***Flow Simulation Model*** gives access to four more menu-items :

- ***Grid Reference Point***
- ***Grid Dimensions***
- ***Model File Settings***
- ***Model Filenames***



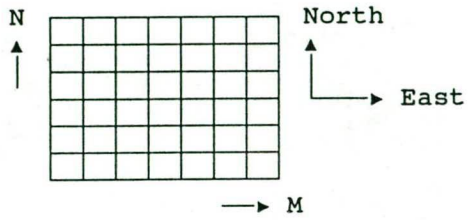
2.3.1.1. Tidal Correction | Flow Simulation Model | Grid Reference Point.

The Tidal Movement Correction program (TMC) will only produce correct quasi-synoptic measurement points when the location of the grid with respect to the Earth is provided.

Therefore the location of one grid point has to be related to an Earth coordinate.

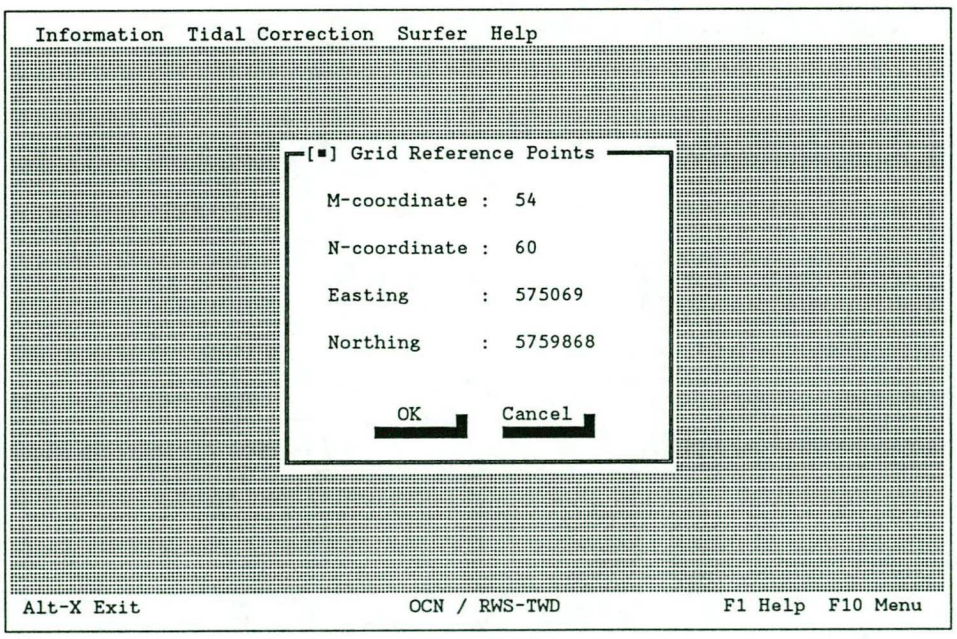
Choosing the option ***Grid Reference Point*** opens a dialog box for entering the coordinates of this reference point.

The grid is supposed to be aligned north-south and east-west. The M variable stands for the grid-coordinate in the west-east direction, the N-coordinate for the grid-coordinate in south-north direction.



Tidal Correction | Flow Simulation Model | Grid Reference Point provides a dialog box for entering :

- M- and N-coordinates of the reference point
- Earth coordinates of this point in UTM coordinates



The variables to be set are :

Reference Point M-coordinate : grid-coordinate of the reference point of the grid in west-east direction.

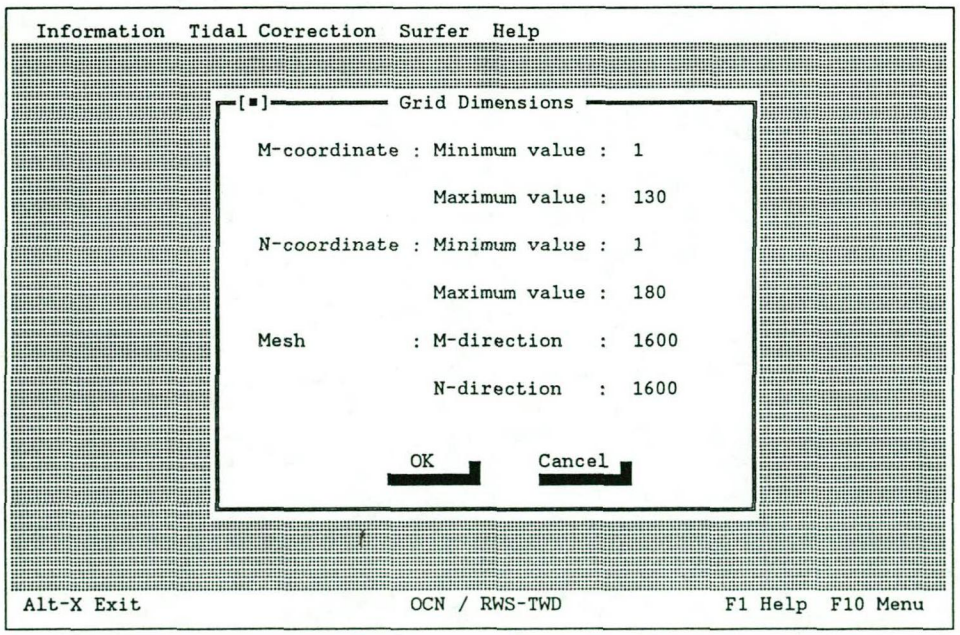
Reference Point N-coordinate	:	grid-coordinate of the reference point of the grid in south-north direction.
Reference Point Easting	:	coordinate of the reference point in meters Easting [UTM].
Reference Point Northing	:	coordinate of the reference point in meters Northing [UTM].

2.3.1.2. Tidal Correction | Flow Simulation Model | Grid Dimensions.

The Tidal Movement Correction program TMC also needs to be provided with the size and dimensions of the grid. The ***Grid Dimensions*** option provides a dialog box for entering these sizes and dimensions.

Tidal Correction | ***Flow Simulation Model*** | ***Grid Dimensions*** provides a dialog box for entering :

- minimum and maximum values of the M- and N-coordinates
- mesh of the grid in M- and N-direction



The variables to be set are :

M-coordinate Minimum Value	:	grid coordinate-value of the most western grid point.
M-coordinate Maximum Value	:	grid coordinate-value of the most eastern grid point.
N-coordinate Minimum Value	:	grid coordinate-value of the most southern grid point.
N-coordinate Maximum Value	:	grid coordinate-value of the most northern grid point.
Mesh M-direction	:	mesh of the grid in east-west direction.
Mesh N-direction	:	mesh of the grid in north-south direction.

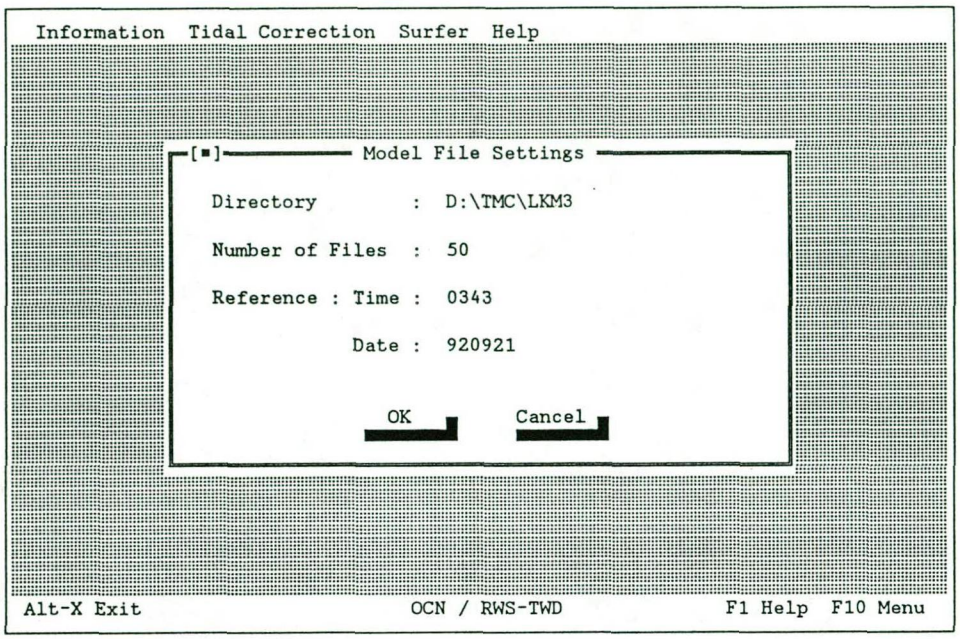
2.3.1.3. Tidal Correction | Flow Simulation Model | Model File Settings.

The Tidal Movement Correction program TMC also has to be provided with information on the model data-files to be used.

Tidal Correction | ***Flow Simulation Model*** | ***Model File Settings*** provides a dialog box for entering :

- directory where the data-files reside
- reference time and date of the data-files
- number of data-files to be used

The reference time and date relate the start of the numerical model time base with a recognised event (e.g. lowtide Hook of Holland). This reference time and date may coincide with the time and date of the first data-file, but may not be later than the time and date of the first data-file.



The variables to be set are :

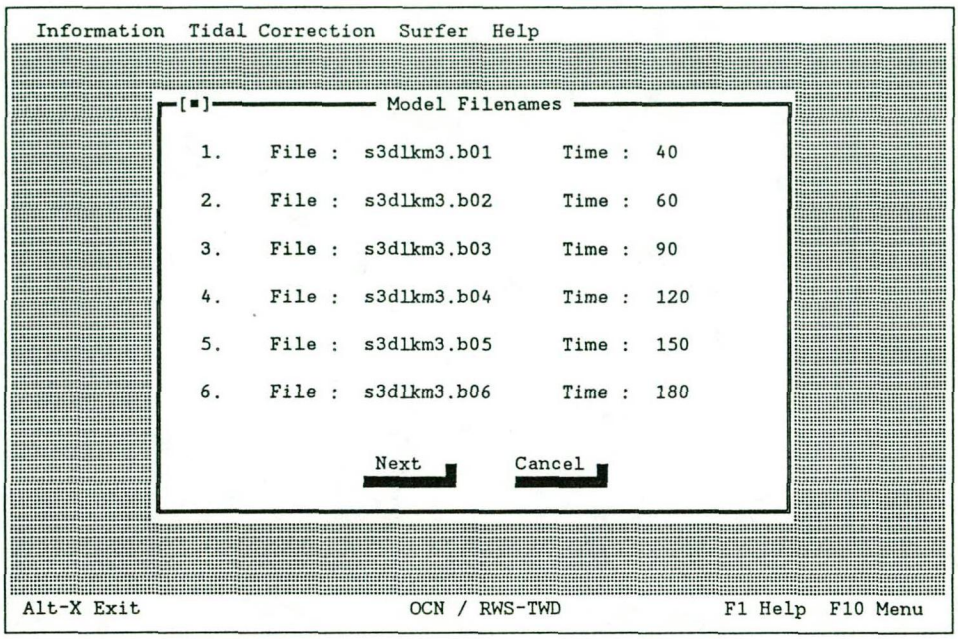
Directory	:	directory in which the data-files from the flow simulation model reside.
Number of Files	:	the number of data-files that form the flow simulation model. Number of Files should be greater than 0 and less than 198.
Reference Time	:	the reference time of the flow simulation model in hours and minutes [hhmm]. The time of the flow simulation data-files is expected in minutes relative to this reference time.
Reference Date	:	the reference date of the flow simulation model in year, month and day [yymmdd].

2.3.1.4. Tidal Correction | Flow Simulation Model | Model Filenames.

The Tidal Movement Correction program TMC needs to know the names of the flow simulation model files and a time of these files relative to the reference time and date as provided in the ***Tidal Correction*** | ***Flow Simulation Model*** | ***Model File Settings*** dialog.

Tidal Correction | ***Flow Simulation Model*** | ***Model Filenames*** provides a dialog box for entering :

- names of the flow simulation data-files
- time of these data-files relative to the reference time and date


Information Tidal Correction Surfer Help
Model Filenames
1. File : s3dlkm3.b01 Time : 40
2. File : s3dlkm3.b02 Time : 60
3. File : s3dlkm3.b03 Time : 90
4. File : s3dlkm3.b04 Time : 120
5. File : s3dlkm3.b05 Time : 150
6. File : s3dlkm3.b06 Time : 180
Next
Cancel
Alt-X Exit
OCN / RWS-TWD
F1 Help F10 Menu

The times of the data-files have to be positive. The reference date and time therefore must precede or coincide with the time of the first data-file.

The variables to be set are :

File : the name of the file which contains results from the flow simulation model.

Time : the time in minutes relative to the reference time and date of the flow simulation model.

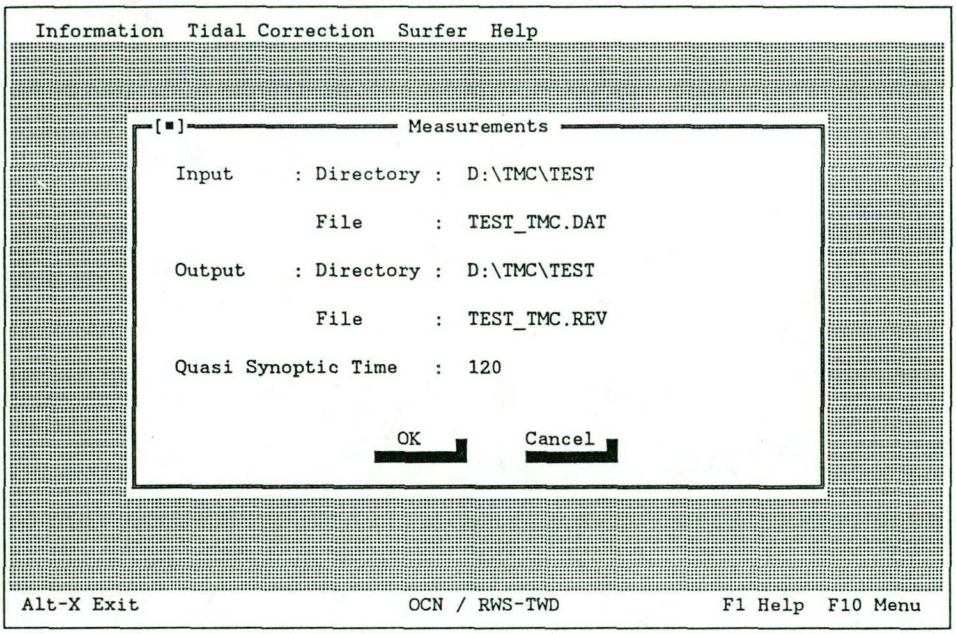
The number of inputfields provided matches the number of files as set in the ***Tidal Correction | Flow Simulation Model | Model File Settings*** dialog box. By executing the **Next** button or the **Previous** button, you can browse through the list of files.

2.3.2. Tidal Correction | Measurements.

In order to work properly the Tidal Movement Correction program needs to be provided with information on the measurement points.

Tidal Correction | Measurements provides a dialog box for entering :

- directory and name of the file containing the uncorrected measurement points.
- directory and name of the file in which the corrected measurement points will be written.
- quasi-synoptic time in minutes relative to the reference time and date as set in the ***Tidal Correction | Flow Simulation Model | Model File Settings*** dialog.



Variables to be set are :

Input Directory	:	directory in which the not corrected measurement input-file resides.
Input File	:	filename of the not corrected measurement file.
Output Directory	:	directory to which the corrected measurement output-file has to be written.
Output File	:	filename of the corrected measurement file. This file will be made if it doesn't exist already, otherwise the file will be overwritten.
Quasi Synoptic Time	:	time in minutes relative to the flow model reference

time and date towards which the measurement points are corrected.

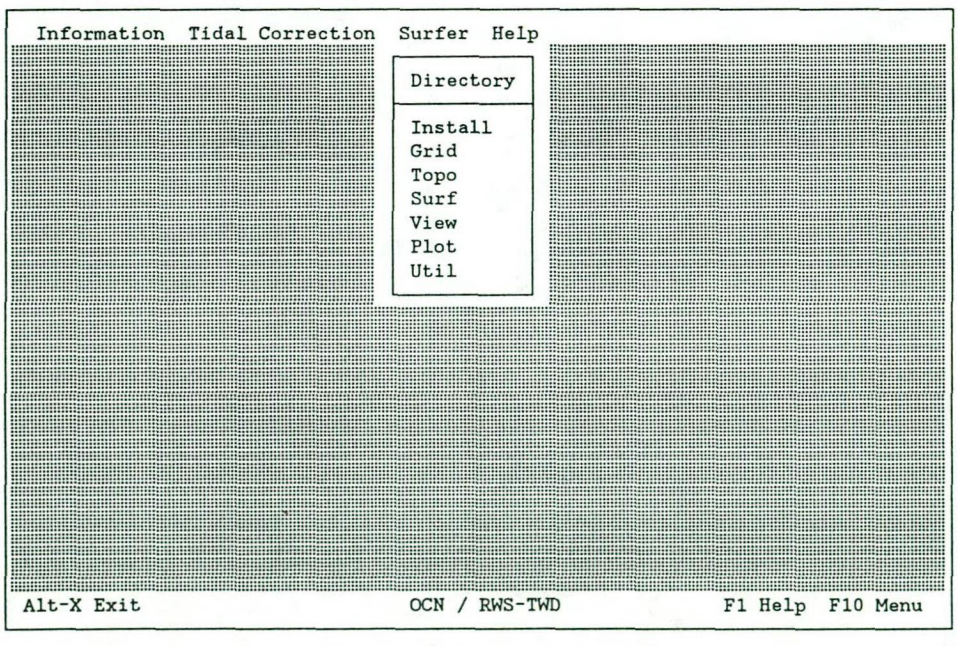
2.3.3. Tidal Correction | Tidal Movement Correction.

The item ***Tidal Correction | Tidal Movement Correction*** will make a configuration file TMC.CFG with the configuration as set in ***Tidal Correction | Flow Simulation Model*** and ***Tidal Correction | Measurements*** and start the Tidal Movement Correction program TMC .

Note : Make sure you have set all configuration variables, otherwise the results can be unpredictable. Also make sure that the measurement file and the data-files have the correct format (see paragraphs 3.2 and 3.3).

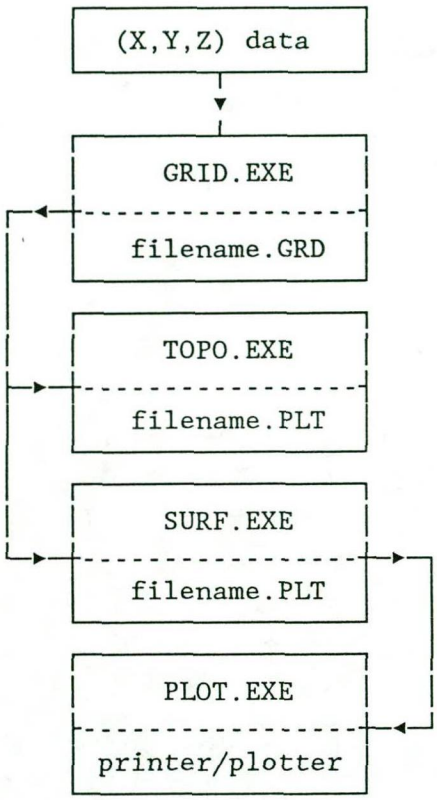
2.4. Surfer.

SURFER is a powerful and flexible tool for creating contour maps and surface plots of XYZ data. The output may be viewed on screen are output to a printer or a plotter.



To present the results graphically SURFER's programs can be used.

A simplified flow chart illustrates the execution order of Surfer's programs.



The GRID program is used to create regularly spaced grid data from irregularly spaced (X,Y,Z) data supplied by the user.

The TOPO program is used to create a contour map from filename.GRD.

The SURF program is used to create a surface plot from filename.GRD.

The PLOT program is used to send a .PLT file to the installed output device.

SURFER is not part of TMCSHELL and has to be purchased separately. SURFER is a product of :

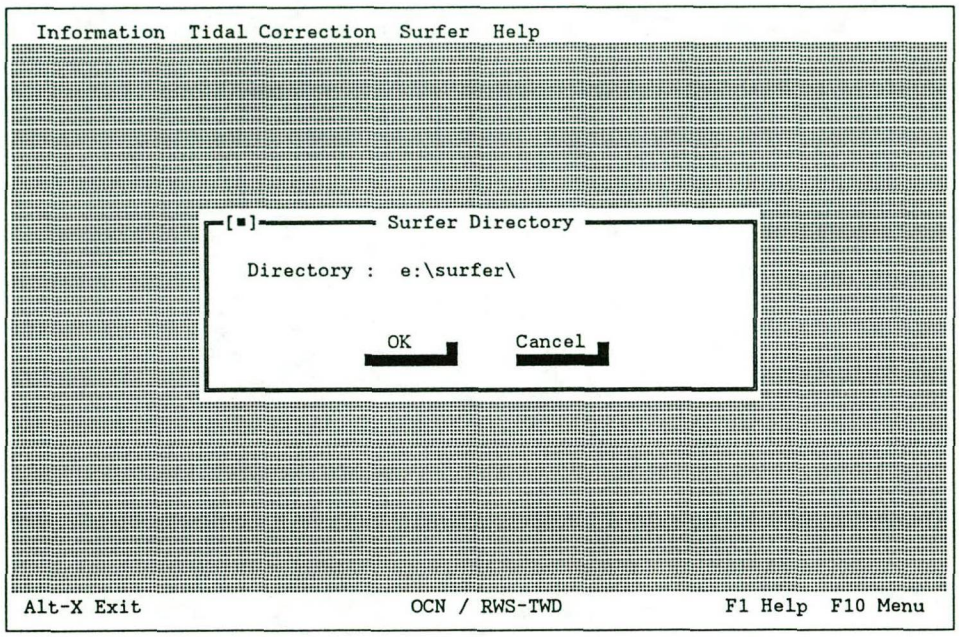
Golden Software, Inc.

809 14th Street
Golden, Colorado 80401 U.S.A.

tel : (303) - 279 - 1021
fax : (303) - 279 - 0909

2.4.1. Surfer | Directory.

This item sets the drive and directory where the SURFER program files reside.



2.4.2. Surfer | Install.

This item starts the SURFER Install program.

For further information on this program see the SURFER manual.

2.4.3. Surfer | Grid.

This item starts the SURFER Grid program. The name of the corrected measurement file is automatically passed on to Grid.

For further information on this program see the SURFER manual.

2.4.4. Surfer | Topo.

This item starts the SURFER Topo program. The name of the output file of the program Grid is automatically passed on to Topo.

For further information on this program see the SURFER manual.

2.4.5. Surfer | Surf.

This item starts the SURFER Surf program. The name of the output file of the program Grid is automatically passed on to Surf.

For further information on this program see the SURFER manual.

2.4.6. Surfer | View.

This item starts the SURFER View program. The name of the output file of the program Topo or Surf is automatically passed on to View.

For further information on this program see the SURFER manual.

2.4.7. Surfer | Plot.

This item starts the SURFER Plot program. The name of the output file of the program Topo or Surf is automatically passed on to Plot.

For further information on this program see the SURFER manual.

2.4.8. Surfer | Util.

This item starts the SURFER Util program.

For further information on this program see the SURFER manual.

3. The Tidal Movement Correction program TMC.

3.1. Description of the program TMC.EXE (TMC.FOR).

First a number of variables are read from the file TMC.CFG. This file is created by TMCSHELL. When the variables are read from TMC.CFG a short check is made on the validity of the variables. For instance it is checked if MMIN is less than MMAX, and it is checked if the Flow Simulation Model Files exist. These checks will not recognize all the faults that can be made when filling the file TMC.CFG, but it was nevertheless thought useful to check for the most obvious mistakes.

After the variables are checked and some preliminary calculations are carried out, one line is read from the Measurement Input File. This line consists of the date, the time, the easting X, the northing Y of the measurements, and a number of measurements.

Now the tidal correction is carried out the on the easting X and northing Y.

Finally the quasi-synoptic date and time, the corrected easting X, the corrected northing Y, and the measurement data are written in the Measurement Output File.

These procedures are repeated until all coordinates of measurement points are corrected for the tidal movement.

3.2. Description of the displacement model files.

The program TMC expects the displacement values of the flow simulation model in a set of ASCII files. This set of files consist of a number of Flow Simulation Model Files, each containing the values for $\Delta x(x,y,t)$ and $\Delta y(x,y,t)$ for a specified Flow Simulation Model File Time after the Flow Simulation Model Reference Time.

In these Flow Simulation Model Files the calculated values of the displacements $\Delta x(x,y,t)$ and $\Delta y(x,y,t)$ have to be given for all grid points, so for all combinations of the points M and N with $MMin \leq M \leq MMax$ and $NMin \leq N \leq NMax$. In order to save diskspace, the values of M and N are omitted and only the values of $\Delta x(x,y,t)$ and $\Delta y(x,y,t)$ are given.

In the Flow Simulation Model Files every line contains the values of $\Delta x(x,y,t)$ and $\Delta y(x,y,t)$ for certain values of the grid coordinates M and N, with N as the fast running index. On line number

$$N+(M-1)(NMax-NMin+1)$$

the values of the displacements $\Delta x(x,y,t)$ and $\Delta y(x,y,t)$ of the point with grid coordinates M and N is contained.

The lines also have a format. Δx and Δy are presented in a 10 character string with:

position 1-5	: $\Delta x(x,y,t)$	[Integer]
position 6-10	: $\Delta y(x,y,t)$	[Integer]

All other positions must be empty. Not even a space is allowed. This is because the program TMC uses the fact that all lines are 10 characters long to find the values of $\Delta x(x,y,t)$ and $\Delta y(x,y,t)$ for M and N quickly.

3.3. Description of the measurement data file.

The program TMC expects the lines in the Measurement Input File to have the following format:

position 1- 12 (right aligned)	: date of measurement	[Integer] [yymmdd]
position 14- 21 (right aligned)	: time of measurement	[Integer] [hhmmss]
position 22- 30 (right aligned)	: easting of measurement	[Integer]
position 31- 39 (right aligned)	: northing of measurement	[Integer]
position 41-240 (left aligned)	: measurement data	

After the tidal correction the results are written to the Measurement Output File in the format:

column 1- 7	: corrected date of measurement	[Integer] [yymmdd]
column 8- 14	: corrected time of measurement	[Integer] [hhmm]
column 15- 21	: corrected easting of measurement	[Integer]
column 22- 30	: corrected northing of measurement	[Integer]
column 30-230	: measurement data	

References.

W.J.A.M. Aarts TMC, Tidal Movement Correction Program, Oceanographic Company of the Netherlands/Tidal Waters Division of Rijkswaterstaat, 1992.